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THE DREO ELINT BROWSER UTILITY (DEBU) REFERENCE MANUAL

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ABSTRACT

An Elint database browsing tool, called DEBU, is presented. DEBU allows Elint and EW databases, such as EPL, Kilting, EWIR and AFEWC, to be easily reviewed and analyzed from a personal computer (PC). DEBU's basic function is to allow users to examine the contents of user-selected subfiles of user-selected emitters of user-selected databases. DEBU augments this functionality with support for selecting (filtering) and combining subsets of emitters by user-selected attributes such as ELNOT, name, parameter type or parameter value. DEBU provides facilities for examining histograms and x-y plots of selected parameters, for doing ambiguity analysis and mode level analysis, as well as for the generation and printing of a variety of reports. With its multiple windows, pop-up menus and help support, DEBU is easy to use.

RÉSUMÉ

Un logiciel de lecture des bases de données d'intelligence électronique appelé DEBU est présenté. Cet outil permet de visualiser et d'analyser les bases de données EPL, Kilting, EWIR et AFEWC sur un ordinateur personnel de type PC. Normalement, DEBU est utilisé pour examiner le contenu d'un sous-fichier constitué d'émetteurs choisis par l'utilisateur. Des fonctions avancées permettent de choisir, filtrer, et combiner des sous-ensembles d'émetteurs selon des caractéristiques telles que le ELNOT, le nom de l'émetteur, le type d'un paramètre, ou la valeur d'un paramètre. DEBU offre aussi la possibilité d'examiner les paramètres choisis sous forme d'histogrammes et de courbes, d'effectuer des analyses d'ambiguïté, en considérant ou non les modes des émetteurs, et de générer et imprimer un éventail de rapports. Ses multiples fenêtres, menus et son système interactif d'aide rendent DEBU très facile à utiliser.

EXECUTIVE SUMMARY

The Defence Research Establishment Ottawa(DREO) has developed an Elint database browsing tool, called DEBU (DREO Elint Browser Utility), that allows Elint and EW databases such as EPL, Kilting, EWIR and AFEWC to be easily reviewed and analyzed from a user-friendly environment on a personal computer (PC). DEBU's basic function is to allow users to examine the contents of user-selected subfiles of user-selected emitters of user-selected databases. DEBU augments this functionality with support for selecting (filtering) and combining subsets of emitters by user-selected attributes such as ELNOT, name, parameter type or parameter value. DEBU provides facilities for examining histograms and two-parameter plots for selected parameters, for doing ambiguity analysis and mode level analysis, as well as for the generation and printing of a variety of reports. With its multiple windows, pop-up menus and help support, DEBU is easy to use. DEBU accesses data and processes requests with sufficient speed for the user to feel that the environment is responsive and interactive. As an example, a user might wish to inspect histogram distributions of scan periods and pri limits of shipborne navigation radars capable of emitting in the range 2000 to 3000 MHz. With DEBU the user can quickly produce the desired report using simple menu operations.

Elint and EW databases such as EPL, Kilting, EWIR, AFEWC and NEDB have existed for many years, they contain extensive amounts of information, and they are widely, internationally used. Each individual agency using an Elint or EW database has its own specific requirements and would typically develop a tool to meet just those requirements. In spite of all the tools being created for use with Elint and EW databases, there were requirements to be able to thoroughly review, categorize and analyze information from a number of Elint or EW databases, not all of the same format, without annoying processing delays, on inexpensive equipment and using a user-friendly environment. DEBU meets these requirements.

The browser that eventually evolved into DEBU was originally developed at DREO to extract information from an object-oriented DREO database that was based on an Elint database. Information from EW databases was also required so the ability to access more than one database, with more than one format, was added. Interest in this facility extended to other scientific groups at DREO who required Elint and EW database review and analysis for other purposes. The capabilities of the browser were described to various DND agencies, where much interest was shown. Each interested group had suggestions for enhancements related to their specific requirement, and where possible, the tools were incorporated into the package. The suggestions were very useful and much appreciated. The resulting DEBU package has considerable functionality and offers a very user-friendly environment.

The capabilities of DEBU are described in this paper along with the usage and operations of the software package. This paper may be used as the user's manual for those using DEBU 3.0.

DEBU is written in Smalltalk. It runs on PC-AT compatible computers (286 or better) with at least 4 MB of extended memory, enough disk space for the Elint and EW databases of interest and Digitalk Smalltalk V/286 software. Mouse and floating-point processor are optional but highly recommended. For hard-copy report generation, a PostScript laser writer is required. DEBU is intended to be used by a single user at a time.

In the report are descriptions of how to install and run DEBU, and how to load and access the Elint or EW databases.

The full functionality and operation of DEBU is described on a pane by pane basis with respect to the menu items that can be selected in each pane. In addition to the general Smalltalk background area and the DEBU window label bar are the following panes: database list, database subsets, emitters list, parameters/subfiles list, report/information, and parameters/subfiles switch.

The functionality of the panes changes depending on the current context, for example, what is selected and what is being displayed. All the possible combinations are examined in this report since the applications are numerous and varied.

There are analysis windows available to expedite parameter analysis. These analysis windows include the histogram browser, the two-parameter plot browser, and the ambiguity analysis browser. The uses and usage of each of these windows is described.

Often the user wants to obtain a hard-copy or report of the data he has obtained in DEBU. The many ways of obtaining reports and the many formats of data are described.

DEBU meets a need in the ESM and Elint communities to be able to review and analyze Elint and EW databases quickly, easily and effectively. DEBU enables analysis of a number of Elint and EW databases of differing formats. DEBU's operating environment is inexpensive and widely available since it is based on a PC.

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1.0 INTRODUCTION

The Defence Research Establishment Ottawa (DREO) has developed an Elint database browsing tool, called DEBU (DREO Elint Browser Utility), that allows Elint and EW databases such as EPL, Kilting, EWIR and AFEWC to be easily reviewed and analyzed from a user-friendly environment on a personal computer (PC). DEBU's basic function is to allow users to examine the contents of user-selected subfiles of user-selected emitters of user-selected databases. DEBU augments this functionality with support for selecting (filtering) and combining subsets of emitters by user-selected attributes such as ELNOT, name, parameter type or parameter value. DEBU provides access to facilities for examining histograms and two-parameter plots for selected parameters, for doing ambiguity analysis and mode level analysis, as well as for the generation and printing of a variety of reports. With its multiple windows, pop-up menus and help support, DEBU is easy to use. DEBU accesses data and processes requests with sufficient speed for the user to feel that the environment is responsive and interactive. As an example, a user might wish to inspect histogram distributions of scan periods and pri limits of shipborne navigation radars capable of emitting in the range 2000 to 3000 MHz. With DEBU the user can quickly produce the desired report using simple menu operations.

Elint and EW databases such as EPL, Kilting, EWIR, AFEWC and NEDB have existed for many years, they contain extensive amounts of information, and they are widely, internationally used. Each individual agency using an Elint or EW database has its own specific requirements and would typically develop a tool to meet just those requirements. In spite of all the tools being created for use with Elint and EW databases, there were requirements to be able to thoroughly review, categorize and analyze information from a number of Elint or EW databases, not all of the same format, without annoying processing delays, on inexpensive equipment and using a user-friendly environment. DEBU meets these requirements.

The browser that eventually evolved into DEBU was originally developed at DREO to extract information from an object-oriented DREO database that was based on an Elint database. Information from EW databases was also required so the ability to access more than one database was added. Not all Elint and EW databases are of similar format so DREO made it possible to analyze more than one format of Elint or EW database. Interest in this facility extended to other scientific groups at DREO who required Elint and EW database review and analysis for other purposes. The capabilities of the browser were described to various DND agencies, where much interest was shown. Each interested group had suggestions for enhancements related to their specific requirement, and where possible, the tools were incorporated into the package. The suggestions were very useful and greatly appreciated.

DEBU Beta Version 2.0 [1] was tested by EWEDC/DND and the release version, described in this paper, is called DEBU 3.0. The

resulting DEBU package has considerable functionality and offers a very user-friendly environment.

DEBU is used on a PC since they are inexpensive and widely available. Smalltalk was used for its inherent functionality and user-interface tools.

The capabilities of DEBU are described in this paper along with the usage and operations of the software package. This paper may be used as a user's manual for DEBU 3.0. It is assumed DEBU users are familiar with the contents and structures of the Elint and EW databases. Knowledge of Smalltalk is not necessary for DEBU users.

The installation and running of DEBU, and loading and accessing the Elint and EW databases are described in Section 2.0.

The full functionality and operation of DEBU is described in Section 3.0 on a pane by pane basis with respect to the menu items that can be selected in each pane. In addition to the general Smalltalk background area and the DEBU window label bar are the following panes: database list, database subsets, emitters list, parameters/subfiles list, report/information, and parameters/subfiles switch.

The functions of the Smalltalk main menu are described in Section 3.1, as well as the help facility available in DEBU. The functions associated with the label bar are listed in Section 3.2.

For the database list pane the main menu functionality is described in Section 3.3. This functionality varies according to whether a root database, a non-root database, nothing, or more than one database is selected.

For the database subsets pane the main menu functionality is described in Section 3.4. The functionality varies depending on whether a database or no database is selected.

The functionality for the emitters list pane is given in Section 3.5. The functionality changes depending on whether one emitter, more than one emitter, or no emitters are selected.

The functionality for the parameters or subfiles list pane is described in Section 3.6. The functionality depends on whether parameters or subfiles are being analyzed. If parameters are being analyzed then functionality depends on whether nothing is selected, one item is selected, two numeric items are selected, or two (not both numeric) or three or more items are selected. If subfiles are being analyzed then functionality depends on whether nothing, one item, or more than one item is selected.

The functionality of the report/information pane is described

in Section 3.7; and the parameters/subfile label choice is described in Section 3.8.

There are windows available to expedite parameter analysis. These analysis windows include the histogram browser, the two-parameter plot browser, and the ambiguity analysis browser. The uses and usage of each of these windows are described in Sections 4.1, 4.2 and 4.3 respectively.

Often the user wants to obtain a hard-copy or report of the data he has obtained in DEBU. The many ways of obtaining reports and the many formats of data are described in Section 5.0.

A glossary of terms used in DEBU and in this paper is given in Appendix A. Printer support is described in Appendix B. The method for loading a new database into DEBU is described in Appendix C.

2.0 EQUIPMENT AND INSTALLATION

DEBU is written in Smalltalk. It runs on PC-AT compatible computers (286 or better) with at least 4 MB of extended memory, enough disk space for the Elint and EW databases of interest and Digitalk Smalltalk V/286 software [2]. Mouse and floating-point processor are optional but highly recommended. For hard-copy report generation, a PostScript printer is required. DEBU is intended to be used by a single user at a time.

The essential DEBU software consists of a Smalltalk IMAGE file, a GO file and a CHANGE.LOG file. The IMAGE file is a "snapshot" of the Smalltalk environment. Each time Smalltalk is started, the last saved image is restored. As Smalltalk starts, it executes the contents of the GO file. The GO file is a plain text file that tells Smalltalk what kind of monitor the system has and the location of various files. It is important that the user review this file and, if necessary, modify it to suit the operational environment. The CHANGE.LOG file records changes to Smalltalk methods and is created if it is missing. The user should refer to Smalltalk documentation for more details [2].

The GO file also informs DEBU of where to find the Elint or EW databases and what their names are. On start-up, DEBU checks whether each named database has been incorporated. If a database is new (not incorporated), DEBU proceeds to read the database file and build an internal index of all of the emitters. If the file does not exist, DEBU attempts to read the file from tape.

Elint and EW databases are normally delivered on 9-track tape. If a compatible tape drive is available, DEBU can copy the file from the tape to a user-specified directory. DEBU converts the file from blocks to lines, removes the trailing blanks, and terminates the lines with linefeeds. If, on the other hand, a compatible tape drive is not available, then the user must explore alternate ways of installing DEBU-format Elint or EW databases. For example, the user might have to locate another DEBU-user who has the database of interest and use a backup facility to copy the database onto compatible media for transfer. Note, however, that the distribution of copies of Elint and EW databases is restricted.

Typically, Smalltalk software is installed in one directory, DEBU software in another directory and pictures in yet another. The user should copy all supplied batch files to a batch directory (often C:\BATCH or C:\BAT). If necessary, the user should create such a directory and edit the PATH specification in C:\AUTOEXEC.BAT to reference this directory. DEBU batch files should be reviewed to ensure that directory references are correct.

2.1 DEBU Start-Up

To start DEBU, the user types the command "DEBU" at the DOS prompt. This invokes a supplied batch file which changes the current directory to the DEBU directory and starts Smalltalk. Smalltalk restores the last saved image. If a window entitled DEBU is not one of the displayed windows, the user can pop up the Smalltalk main menu by clicking the right button on the mouse, as described in section 3.1.1, and select DEBU.

3.0 FUNCTIONALITY AND OPERATIONS

This section describes all of the functionality of DEBU version 3.0 and how to operate and access the functions. The main window for DEBU is shown in Figure 3.1. The window comprises a number of panes. The functionality available for each of these panes is described in a separate section. In addition to a general discussion, which includes information on the functionality available for the background area behind the DEBU window and the help utility common to all panes, there is a description of the functionality in the panes for the label bar (Pane 2), the database list (Pane 3), the database subsets (Pane 4), the emitters list (Pane 5), the parameters/subfiles list (Pane 6), the report/information (Pane 7), and the parameters/subfiles switch (Pane 8). Pane numbers used in this paper are shown in Figure 3.1.

Menus are available for each pane. The items on each menu vary according to the pane and to the selections made within the panes, since functionality changes depending upon selections made. For each pane and set of selections, this report lists the menu items in the order they appear. A description of the functionality of each menu item is given for each pane.

It should be noted that if a user wishes to compare information in more than one area of interest, for example two databases, it is possible to open two or more DEBU windows simultaneously. Each DEBU window operates independently. This would be useful for comparisons between databases or data samples.

3.1 General

In the Smalltalk environment, the user manipulates applications through dedicated windows. Windows are organized as a collection of panes; each of which is typically a list pane or a text pane. List panes display a list of items from which the user may choose. All of the panes in DEBU are list panes. There is also a system window, which comprises all parts of the screen not covered by an application window. These are described in greater detail in the Smalltalk/V286 Tutorial and Programming Handbook [2].

A number of enhancements have been made to the DEBU image which are not described in the Smalltalk/V286 Tutorial and Programming Handbook. In particular, the operation of list panes has changed. To select an item in a list pane, simply move the cursor with the mouse to the line of interest and click the left mouse button. A second click on the same line deselects the line. To select more than one item, hold the shift key on the keyboard while selecting with the left mouse button.

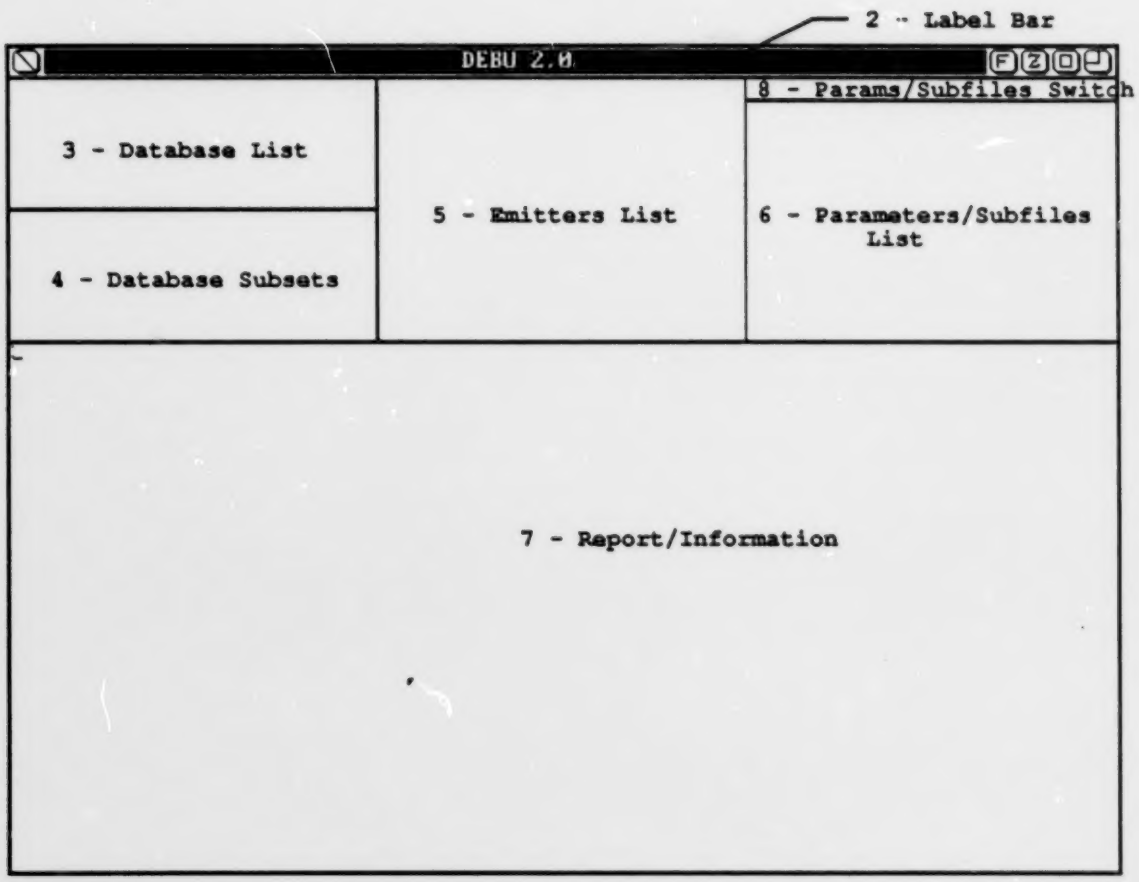

Figure 3.1 Panes and Areas of Interest of Main DEBU Window

Another way to select an item in a list pane is to move the cursor into the list pane and begin to type the contents of the desired line. As each new character is entered, the list repositions itself to the first matching line. To select that line, press ENTER on the keyboard or select with the mouse. To search for another line or to correct the search text, move the cursor out of the pane and then back in.

Menus are available for each pane. Move the cursor to the pane of interest and click the right mouse button. The menu appears. To select a menu item, move the cursor to the desired line and click with the left button. Help is available for virtually all menu items in DEBU. To get help, move the cursor to the line of interest and click with the right button.

It may happen that the list of information in the pane is longer or wider than the space provided by the pane. The technique for manoeuvring through the text is the same as for Smalltalk in general. A scroll bar, for manoeuvring up and down through the text, appears along the right side of the pane while the right mouse button is held down. It is possible to travel up, down, right and left by keeping the right mouse button depressed and dragging the arrow that appears in the desired direction.

The normal cursor in DEBU is an arrow, however, when a user makes a request that may involve processing time more than one or two seconds, the hourglass cursor appears in place of the arrow to indicate that the system is held up while the processing is being done.

CTRL Break may be used if the user wishes to halt a process. This would be the case if the user decides his selection would take too long, or that he prefers a different selection. A red "Break" window appears,,which should be closed. (A window may be closed by clicking on the close window icon in the upper left corner of a window.) DEBU is then in the state it was before the last user request.

3.1.1 Smalltalk Main Menu

The operations of the Smalltalk main menu are described here. From any background area on the screen not covered by a window, the main menu can be opened by clicking the right button on the mouse. The main menu's functions include:

save image

When terminating a session it is necessary to decide if changes were made that should be preserved, for example a subset of a database was created. If so, then upon exiting Smalltalk, save the image. The next time DEBU is run it will start from the same state as when it was saved.

exit Smalltalk

This is used to exit Smalltalk and therefore DEBU. The user is prompted with a choice of saving the image first or just exiting. If the user wishes the image to open in the same manner as previous times and nothing new has been created then the image need not be saved.

DEBU

If a DEBU browsing window is open when the software is started up then review and analysis can begin. Otherwise a DEBU browsing window can be opened by choosing the DEBU function on the main Smalltalk menu. Note that more than one DEBU browsing window can be open at once.

redraw screen

This is used if the content of the screen has been corrupted in some way.

3.1.2 Help

The help facility is available in each of the main menus for panes 3 through 7. If it is selected a supplementary menu pops up with the contents as follows.

about DEBU

copyright

how to get menu help

how to add a new database

how to load a database from tape

how to remove a database

how to collect new parameters

how to exit

print help report

3.1.2.1 Descriptions of Help Menu Items

about DEBU

The DREO ELINT BROWSER UTILITY, developed by DREO and PRIOR Data Sciences, provides the user with tools to quickly and easily examine, filter, analyze and produce a variety of reports for Elint and EW databases such as Kilting, EWIR, AFEWC, EPL and NEDB.

DEBU is a dedicated browsing tool optimized for rapid

responses to a variety of queries. For example, a user might wish to inspect the histogram distributions of scan periods and pri limits of shipborne navigation radars capable of emitting in the frequency range 2000 to 3000 MHz. With DEBU, the user can quickly produce the desired report with simple menu operations without resorting to the formal query language of a conventional DBMS. DEBU is not a database management system -- DEBU does not allow users to change the contents of Elint or EW database source files.

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DREO ELINT BROWSER UTILITY:
DEVELOPED AT
DEFENCE RESEARCH ESTABLISHMENT OTTAWA
(C) HER MAJESTY THE QUEEN
AS REPRESENTED BY THE MINISTER OF NATIONAL DEFENCE,
1990, 1991

how to get menu help

Most menu items in the Elint Browser have help text available. By selecting the menu item with the right button, a special window pops up describing the selected menu item. To exit, the user must move the cursor outside the window and press any mouse button.

If desired, the user may edit the help text. To preserve edits, he may select the looping arrow icon at the upper right or pop up the menu in the help pane and select ACCEPT.

how to add a new database

1. Edit the GO file to add the name and path of the new source database to the end of existing lists in the GO file.

   For example:

```
ElintObject
    PicturesPath: 'e:\pictures';
    addSources: #(EPL91 Kilting88)
    paths: #('e:\epl91\epl.src'
        'e:\kilt88\kilt88.src').
```

   If the path involves a new directory, DEBU creates it.

   For EPL or NEDB databases, the chosen source name must begin with 'EPL' or 'NEDB', since DEBU interprets those source files with an EPL interpreter. Otherwise, DEBU interprets the source files with an Elint interpreter.

2. Restart the DEBU image. If the file does not exist, the GO file installs the new database. The user is prompted for information during the installation. Allow 4 to 5 minutes per megabyte of source file for installation, (on

an Ogivar System 386/33 MHz).

how to load a database from tape

Follow the instructions provided in HELP: HOW TO ADD A NEW DATABASE. During reboot of the DEBU image, if the source file for an unloaded database does not exist, DEBU attempts to load the database from tape.

DEBU 3.0 loads tapes using the Overland Data tape drive controller. To date, no other controller has been tested.

how to remove a database

To remove a database, select it and pop up the menu. Select REMOVE DATABASE. DEBU asks for confirmation. If affirmed, DEBU removes the database from the image. If the database is a root database, derived databases are removed. Next, edit the GO file to remove references to this database. Save the image to preserve the removal. Reboot Smalltalk in the usual way.

how to collect new parameters

Collect parameter of interest (POI) such as RF LIMITS, which is used in the pruning of emitter lists.

1. Select an emitter which has the POI.
2. Select the subfile (pane 6) which has the POI.
3. Pop-up the menu and select the line COLLECT NEW PARAMETERS. Parameters available in the subfile are listed.
4. Select the POI. The browser reads the entire source database and collects the POI. This may take many minutes, depending on the system.

how to exit

HOW TO EXIT SMALLTALK:
Point the cursor at a spot on the screen outside of any windows and pop up the Smalltalk main menu. Select the line EXIT SMALLTALK. A secondary menu pops up which asks whether to forget the image, save the image or continue. Save the image to preserve any changes. Otherwise, forget the image.

HOW TO EXIT THE BROWSER:
Click on the square icon in the upper left corner of the browser window.

print help report

Output to the printer (or file) a formatted report comprising all help descriptions of all menu items.

3.2 Pane 2 - Label Bar

Refer to Figure 3.2 for the functions of the label bar

buttons.

3.2.1 Main Menu for Pane 2

print

colour

collapse

cycle

frame

move

close

3.2.2 Descriptions of Pane 2 Menu Items

print
Prints the Elint Browser window.

colour
Changes the colour of the text or the background.

collapse
Collapses window to show only the label bar.

cycle
Cycles through displayed windows.

frame
Resizes the window.

move
Drags the window to a new location.

close
Closes the window.

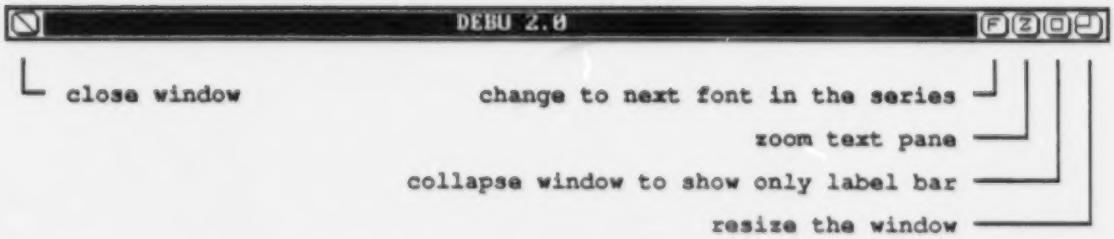
DEBU 2.0
close window
change to next font in the series
zoom text pane
collapse window to show only label bar
resize the window

Figure 3.2 Label Bar Buttons

3.3 Pane 3 - Databases List

This pane lists all the names of the databases and previously saved database subsets available. If one of the databases is chosen (shown in reverse video) then the list of associated database subsets is shown in pane 4. The list of emitters associated with that database are listed in pane 5, the list of parameters available in the database is shown in pane 6 and some detail on the selected database is shown in pane 7. If more than one database is selected then combining can take place using the lists in pane 4.

3.3.1 Main Menu for Pane 3 if a Root Database is Selected

A root database is an entire original database, for example EWIR as loaded from tape.

remove database

rename database

inspect notes

pictures directory

special operations

Special operations - supplementary menu

remove parameter

file out parameter

file in parameter

batch parameter: add

batch parameter: remove

batch parameters: collect

collect special parameter

Collect special parameter - supplementary menu

collect parameter by number

count Tx antennas

count links in Suffix Tables

collect stagger intervals

collect all parameter types

about this pane

HELP

3.3.2 Main Menu for Pane 3 if a Non-Root Database is Selected

remove database

rename database

about this pane

HELP

3.3.3 Main Menu for Pane 3 if Nothing is Selected

about this pane

HELP

3.3.4 Main Menu for Pane 3 if More than One Database is Selected

about this pane

HELP

3.3.5 Descriptions of Pane 3 Menu Items

about this pane

This pane lists the names of retained root databases and derived databases. Root databases are the primary holders of emitter information and are extracted from the database source file. Indexes to emitter parameters are held by root databases. Each derived database is a subset of a root database and is listed indented under its root.

DEBU understands the following emitter database formats: AFEWC, EWIR, KILTING, EPL and NEDB.

remove database

Removes the currently selected database from the list of available databases. If the selected database is a 'root' database, from which other databases are derived, it may not be removed until all of its derivatives have been removed. These are listed. When selected, a window asks the user to confirm his decision.

rename database

Prompts the user for a new name for the selected database. If the name is accepted, the database is renamed.

inspect notes

Opens a window on the dictionary of notes users may have made on different emitters.

pictures directory

Starts a Smalltalk Inspector for the available picture files of emitter systems. The Inspector consists of two panes. The left pane is a list of the names of emitter systems. The right pane shows the name of the file of the selected emitter system. The file name may be corrected and saved (right pane menu ACCEPT) if desired.

If a new picture file is available in the Pictures directory, the user may associate the name of this file with names of the appropriate emitter systems. To do so the user must:

1. Move the cursor to the left list pane, pop up the menu and select ADD.
2. At the prompt for key expression, provide the name of the appropriate emitter system within single quotes, and press return. (The Inspector changes the right pane to show nil.)
3. Change nil to the name of the picture file.
4. Pop up the menu in this pane and select SAVE.

special operations

Pops up a secondary menu of special operations available for the selected root database.

remove parameter

Provides the user with a list of parameters from which one may be selected for removal. Before the selected parameter is removed, the user is asked to confirm.

file out parameter

Provides a list of parameters from which the user may select one for writing to a file. Before filing out the parameter, DEBU asks for name and location of target file.

file in parameter

Prompts the user with a list of all load files (with extension .LDR) in the database source directory. A selected file is filed in. A load file is the result of filing out a parameter: (Refer to FILE OUT PARAMETER). A filed-in parameter is installed as a parameter of the currently selected root database. This is useful if a database which has already had many parameters collected has been added to a

new image. The root database to which the collected parameter applies must already have been loaded. A parameter collected for one root database is only applicable to that root database.

Load files for a database must reside in the same directory as the database source file (as specified in the GO file).

batch parameter: add

Adds a parameter to batch parameters. These are a collection of parameters which may be collected as a batch. See COLLECT BATCH PARAMETERS.

The user is prompted to select a parameter from a list of all of the parameters collected to date for the current database. This parameter is then added to the list of batch parameters.

batch parameter: remove

Removes a parameter from the list of batch parameters. These are a collection of parameters which may be collected as a batch. Refer to COLLECT BATCH PARAMETERS.

The user is prompted to select a parameter from a list of all of the batch parameters. The selected parameter is then removed.

batch parameters: collect

Collects all parameters listed in batch parameters.

Batch parameters are a collection of parameters which may be collected together by a single menu invocation. This is useful if there is a standard set of parameters which are to be collected for each new database added to the image.

For each batch parameter, DEBU reads the entire source database and collects that parameter. Each pass takes between 4 to 5 minutes per megabyte of source on a 386/33 MHz system.

Upon confirmation, the image is saved to preserve the changes.

collect special parameter

Provides the user with a list of available special parameters which, for a variety of reasons, must be collected using specialized procedures.

For example, of particular use for Kilting style databases is the special parameter 'PARAMETER TYPES'. This is an index which relates parameter types to emitters, maintaining information about Kilting tree position. A user may, for example, retrieve all emitters which exhibit variable PRI behaviour without naming all parameter types in the subtree on or below the node 'NON CONSTANT PRI'.

collect parameter by number

(Applicable only to Kilting style databases and not to EPL or NEDB.)

Prompts for the tree node number of the parameter of interest (POI). DEBU then reads the entire source database and collects the POI. The default name of the parameter is the label of the first record matching the entered tree node number.

Collection takes less than 4 minutes per megabyte of database source file on a 386/33 MHz system.

count Tx antennas

Collects the number of transmitting antennas of each database entry.

The problem here is that there is no simple way to determine whether a given database entry is a system which may simultaneously emit more than one beam. It was necessary to add specialized code to handle this.

count links in Suffix Tables

Determines the number of links in the suffix tables. Links are optional numbers to the left of commas in suffix tables used to indicate modes which may appear concurrently. The number of links may be useful in determining how complex the emitter is.

collect stagger intervals

Collects stagger intervals for all emitters when available. The intervals collected are from the Kilting tree node numbers:

000001312215.20
000001312215.30
000001312215.40
000001312215.50
000001312215.60
000001312215.70
000001312215.80.

collect all parameter types

Builds a lookup table relating each parameter type of the root database to a list of emitters having that type.

This permits searches for all emitters having a particular parameter type, such as STAGGERED PRI.

This operation should be performed only once after initial installation.

HELP - Described in 3.1.2.

3.4 Pane 4 - Database Subsets

If one of the subsets is chosen (shown in reverse video) then the emitters in the subset are listed in pane 5, the parameters available in the subset is shown in pane 6 and some detail on that subset is shown in pane 7.

3.4.1 Main Menu for Pane 4 if no Database Subset is Selected

about this pane

HELP

3.4.2 Main Menu for Pane 4 if a Database Subset is Selected

make subset a named database

about this pane

HELP

3.4.3 Main Menu for Pane 4 if More than One Database Subset is Selected

combine lists

Combine lists - supplementary menu

and: intersection of selected lists

xor: union without intersection

or: union of selected lists

list 1 - list 2

about this pane

HELP

3.4.4 Descriptions of Pane 4 Menu Items

about this pane

This pane lists derived subsets of the selected database(s). A database subset may be the result of combining operations on one or more database subsets, accessed through this pane's menu, or the result of filtering operations, accessed through the EMITTER LIST PANE's menu.

Derived database subsets are normally lost as soon as another database is selected in the DATABASE LIST PANE. To preserve a derived database subset the menu item MAKE SUBSET A NAMED

DATABASE, from this pane, is used.

make subset a named database
: Makes the currently selected database subset available as a permanent named database. This is the only way that database subsets may be saved for later reference. DEBU prompts for a name for the derived database and adds it to the DATABASE LIST PANE below the name of its root database.

  On exiting from Smalltalk, the image must be saved; otherwise the new database is lost.

combine lists
: Pops up a supplementary menu for combining (joining, merging) user-selectable derived emitter lists. The derived list is added to the end of the list of derived emitter lists.

and: intersection of selected lists
: Derives a new list of emitters which comprise the emitters common to all selected lists (their intersection).

xor: union without intersection
: Derives a new list of emitters which comprise all members of the selected lists (their union) without their common emitters (their intersection).

  This is analogous to the eXclusive OR (XOR) operation of boolean logic.

or: union of selected lists
: Derives a new list of emitters which comprises all of the selected lists (their union).

  This is analogous to the OR operation of boolean logic.

list 1 - list 2
: Derives a new list of emitters from the first selected list with elements of subsequent lists removed.

HELP - Described in 3.1.2.

3.5 Pane 5 - Emitters List

The list of emitters is usually long. One or more emitters may be selected by clicking the left mouse button while the cursor points to the line of interest. To select multiple emitters, hold the Shift Key while selecting. To deselect a selected emitter, reselect the emitter. If the user wishes to view information off the screen then he may use the scroll bar. If the user wishes to jump to the area in the emitter list beginning with certain alphanumerics then by typing one or more characters on the keyboard the viewed portion of the list jumps to the line beginning with the

selected characters. (Note the cursor must remain in the pane of interest, in this case pane 5.)

If one emitter is selected (shown in reverse video) then, depending on the pane 8 selection, the list of subfiles for which there is information for that emitter or the list of parameters associated with the emitter is shown in pane 6. If the subfile switch is chosen the report pane lists the suffix table. If more than one emitter is selected (each shown in reverse video) then the user can view in pane 6 the list of subfiles for which there is information for those emitters or the list of parameters associated with those emitters. If no emitter is selected the user can still view the subfiles or parameters lists that would be associated with all the emitters, again in pane 6.

3.5.1 Main Menu for Pane 5 with One Emitter Selected

view picture

view source

browse emitter(s)

options for printing

options for printing - supplementary menu

print formatted emitter source

print raw source

print user notes

make notes on selection

special operations

special operations - supplementary menu

inspect parameter tree (Note that inspecting the parameter tree is not well supported but may be used for basic review of the Kilting tree structure. It was intended for debugging purposes but was left in DEBU 3.0 due to some general interest.)

about this pane

HELP

3.5.2 Main Menu for Pane 5 with more than One Emitter Selected

options for printing

create database subset with selection

create database subset without selection

special operations

about this pane

HELP

3.5.3 Main Menu for Pane 5 with no Emitters Selected

select by name

select by comment search

select by notation

select by parameters

reject by notation

reject by parameters

options for printing

about this pane

HELP

3.5.4 Descriptions of Pane 5 Menu Items

about this pane

This pane lists the Elint Notation (or Spot Number for NEDB) and name of each emitter of the selected database subset in the DATABASE SUBSETS LIST PANE. If no database subset is selected, emitters of the selected database in the DATABASE LIST PANE are listed.

Zero, one or more emitters may be selected. To select only one emitter, simply use the left mouse button. To deselect a selected emitter, reselect the emitter. To select multiple emitters, hold the Shift Key while selecting. Note that available menu options change, depending on the number of emitters selected.

view picture

Shows a radar picture at the upper left part of the screen, if one is available. Pictures are in external TIF format files, scanned from line drawings.

References to pictures are by name, not by ELNOT or Spot Number. To add a new picture, inspect a root database (via DATABASE PANE menu with a database selected).

view source

Shows the raw text for the selected emitter in a separate window. This text comprises all of the records of the selected emitter.

browse emitter(s)

Opens a new DEBU browser on the selected emitter(s). This subset of emitters then has its own DEBU browser, with full functionality.

options for printing

Pops up a supplementary menu for selecting what is to be filed out.

print formatted emitter source

Prints the full formatted source for each selected emitter. If no emitter is selected, then files out full report for all emitters in the database.

print raw source

Prepares a print file of the raw source for each selected emitter. Prints each file. File names consist of the id of the emitter with the extension '.src'.

print user notes

Prints the notes, input by the user(s), associated with the selected emitters. If no emitter is selected then print the entire list of user notes.

make notes on selection

Pops up a window containing existing notes. The user may edit the notes then save them, either with the ACCEPT button (looping arrow icon at upper right) or by choosing ACCEPT from the menu. Notes are preserved by DEBU according to ELNOT or Spot Number. This means that different databases share Notes on a given emitter.

To view all notes, the user must select a root database, pop up the menu and select INSPECT NOTES. To print all notes, the user must pop up the same menu and select PRINT NOTES.

special operations

Pops up a secondary menu of special operations available for the selected root database.

inspect parameter tree

(Applicable only to Kilting style databases and not to EPL or NEDB.)

Opens a window which shows the parameter tree of the selected emitter. This utility may be useful for those interested in the structure of Kilting style databases.

HELP - Described in 3.1.2.

create database subset with selection

Creates a new database subset consisting of just the selected emitters.

create database subset without selection

Creates a new database subset consisting of all the emitters of the currently selected database subset except those selected.

select by name

Pops up a prompter requesting a string fragment to match against the names of all emitters in the currently selected database subset. Emitters with names containing the string fragment are collected into a new database subset.

select by comment search

Pops up a prompter requesting a string fragment to match against the comments of all emitters in the currently selected database subset. Emitters with comments containing the string fragment are collected into a new database subset.

select by notation

Pops up a prompter requesting an ELINT notation (ELNOT) to match. The ELNOT is presented as a five character string of '*'s. '*' can match any character. Each '*' may be replaced with a letter or number to match.

Emitters of the currently selected database subset with notations which match the query are collected into a new database subset.

select by parameters

Prompts the user for a measurement parameter from the current list of parameters (same as the list of parameters available in the right list pane). Then prompts for the actual measurement to match. All emitters from the current database subset which match the desired measurement are collected.

Numeric measurements are often shown as ranges: eg. (2000 >> 9000). Prompters for numeric measurements initially show the full span of the observed range.

reject by notation

Pops up a prompter requesting an ELINT notation (ELNOT) to match. The ELNOT is presented as a five character string of '*'s. '*' can match any character. Each '*' may be replaced with a letter or number to match.

A new database subset is created from the currently selected database subset excluding emitters with notations which match the query.

reject by parameters

Prompts the user for a measurement parameter from the current list of parameters (same as the list of parameters available in the right list pane). Then prompts for the actual measurement to match. Collects all emitters from the current database subset which do not match the entered measurement.

Numeric measurements are often shown as ranges: eg. (2000 >> 9000). Prompters for numeric measurements initially show the full span of the observed range.

3.6 Pane 6 - Parameters or Subfiles List

Parameters are commonly known names and groupings of data in the Elint and EW databases. Subfiles are the actual divisions in the Kilting databases. The information available in the chosen database for all emitters selected and for all parameters or subfiles selected is listed in the report pane. If no emitters are selected then DEBU assumes all emitters are of interest. Pane 8 allows a switch between the subfiles list and the parameters list. Information on any selections in this pane is shown in the report/information pane (pane 7).

If the subfiles list is in pane 6 and more than 20 emitters from pane 5 are referenced, a warning window pops up the moment the user tries to select a subfile item. The warning window queries the user as to whether or not he wishes to display the report in pane 7 for the number of emitters indicated. If the user selects "yes" the request proceeds; if he selects "no" the report pane remains blank. The user can still print out the report even though it is not visible in pane 7.

3.6.1 Main Menu for Pane 6 with Parameters - Nothing Selected

add parameter by name

add parameter by tree node number

about this pane (parameters)

HELP

3.6.2 Main Menu for Pane 6 with Parameters - One Selection

histogram

parameter report by emitters

parameter report by parameter

modes report

inspect emitter level ambiguity sets

inspect mode level ambiguity sets

about this pane (parameters)

HELP

The functionality of the histogram window is described in Section 4.1, and the functionality of the ambiguity inspection window is described in Section 4.3.

3.6.3 Main Menu for Pane 6 with Parameters - Two Selections, Both Numeric

emitter level 2-parameter plot

mode level 2-parameter plot

parameter report by emitters

parameter report by parameter

modes report

inspect emitter level ambiguity sets

inspect mode level ambiguity sets

about this pane (parameters)

HELP

The functionality of the two-parameter plot window is described in Section 4.2, and the functionality of the ambiguity inspection window is described in Section 4.3.

3.6.4 Main Menu for Pane 6 with Parameters - Two Selections but not Both Numeric, or Three or More Selections

parameter report by emitters

parameter report by parameter

modes report

inspect emitter level ambiguity sets

inspect mode level ambiguity sets

about this pane (parameters)

HELP

The functionality of the ambiguity inspection window is described in Section 4.3.

3.6.5 Main Menu for Pane 6 with Subfiles - Nothing Selected or More Than One Selection

about this pane (subfiles)

HELP

3.6.6 Main Menu for Pane 6 with Subfiles - One Selection

collect new parameters

about this pane (subfiles)

HELP

3.6.7 Descriptions of Pane 6 Menu Items

about this pane (parameters)

This pane lists the names of parameters collected to date for the root database of the selected database subset. Here, the term parameter refers to a resident index used by DEBU which relates parameter values to emitters which have the values. The index is called resident because it remains in the Smalltalk image.

When a database is first installed, it has no parameter indexes. DEBU users decide what parameters are of interest and instruct DEBU to collect them. This is done through menu operations. DEBU reads every record of the root database source file to extract the required values for each emitter and build a parameter index.

about this pane (subfiles)

This pane lists the subfiles for the selected emitter. Kilting style databases (such as EWIR and AFEWC) divide records for each emitter into topics called subfiles. Typically, these databases provide a title for each subfile and these are listed in this pane. EPL and NEDB do not have subfiles, so DEBU gives them one called 'MODES'.

When a subfile is selected, records of the subfile are listed in the REPORT PANE, together with related comments. Kilting style databases list all comments for each emitter after all of the emitter's parameter tree records. A parameter tree record often refers to a comment and this means that, for hardcopy listings, an analyst has to do a lot of paper-flipping to read comments relating to each parameter tree record. DEBU determines what comments were referenced within a selected subfile and just lists those comments.

In the REPORT PANE, if TRAINER is available, the user may obtain explanations for lines referencing Kilting style parameters.

add parameter by name

(Applicable only to Kilting style databases and not to EPL or NEDB.)

Allows the indirect addition of a parameter by name. Note that DEBU does not allow direct addition of a parameter by name because the same name may have more than one tree node number. For example, RF LIMITS appears for both RF and CW.

To indirectly add a parameter by name, the user must:

1. Select an emitter and subfile likely to have the desired parameter.
2. Pop up the subfiles menu and select the option to add a new parameter. A list of the available parameters is then displayed.
3. Select the desired parameter.
4. After collecting the parameter, save the image.

add parameter by tree node number

(Applicable only to Kilting style databases and not to EPL or NEDB.)

Prompts the user for the tree node number of the parameter of interest (POI). DEBU then reads the entire source database and collect the POI. The default name of the parameter is the label of the first record matching the entered tree node number.

Collection takes less than 4 minutes per megabyte of database

source file.

histogram

Opens a new window for browsing the histogram of the selected parameter. Two types of histograms are available, numeric and alphanumeric, depending on the type of data to be histogrammed.

parameter report by emitters

Lists the selected parameters in the report pane by emitters.

parameter report by parameter

Lists the selected parameters in the report pane ordered by parameter.

modes report

Lists the modes report for the selected parameters and selected emitters in the report pane. A modes report is a table of the values of the selected parameters for each mode of the selected emitters. For all databases, this involves going to the database source file to extract mode information. For EPL and NEDB, this is simple, since data records are already in modes. However, for Kilting style databases, the process is more difficult and time consuming. Modes for each emitter must be built taking into account the valid combinations of suffixes of the selected parameters based on the suffix table.

This report is produced for selected emitters only. If no emitter is selected, the user is notified.

inspect emitter level ambiguity sets

Inspects ambiguity sets comprised of selected parameters from the currently selected database for the currently selected emitter(s). Inspects all ambiguity sets if no emitter is selected. This method uses resident values of the parameters and assumes all combinations of parameters (modes) are valid. This method is faster than MODE LEVEL AMBIGUITY SETS.

An ambiguity set is a collection of emitters which, for the parameters under consideration, cannot be resolved from one another. A given emitter may appear in more than one ambiguity set.

inspect mode level ambiguity sets

Inspects ambiguity sets comprised of selected parameters from the currently selected database for the currently selected emitter(s). If no emitter is selected then inspects all ambiguity sets. This method goes to the source database to determine which combinations of parameters (modes) are valid. This method is slower than EMITTER LEVEL AMBIGUITY SETS.

An ambiguity set is a collection of emitters which, for the parameters under consideration, cannot be resolved from one another. A given emitter may appear in more than one ambiguity set.

emitter level 2-parameter plot

Opens a new window for browsing a 2-dimensional plot of two numeric parameters. All combinations of the parameters are shown, irrespective of the Suffix Table.

mode level 2-parameter plot

Opens a new window for browsing a 2-dimensional plot of two numeric parameters. Only valid combinations of the parameters are shown, based on the Suffix Table.

collect new parameters

Collects parameters of interest (POI) such as RF LIMITS, which are used in the pruning of emitter lists.

All parameters available in the currently selected subfile are listed in a prompter window. After selecting the parameter of interest, DEBU reads the entire source database and collects the POI. This may take up to 4 minutes per megabyte of source database file.

DEBU, upon confirmation, saves the image to preserve the changes.

HELP - Described in 3.1.2.

3.7 Pane 7 - Report/Information

All textual information or report requests made via the other DEBU panes are displayed in this pane.

3.7.1 Main Menu for Pane 7

print contents

search for key words

search for key words to printer

about this pane

HELP

3.7.2 Main Menu for Pane 7 when a Tree Node Line is Selected

print contents

search for key words

explain parameter

about this pane

HELP

3.7.3 Descriptions of Pane 7 Menu Items

about this pane
: This pane serves as the place where all reports are displayed. Text in this pane depends on the last item selected and on menu operations.

  From this pane, reports may be output either to a printer or to a file.

print contents
: Prints entire contents of the bottom pane. Output is formatted for the printer specified in the GO file.

search for key words
: Pops up a prompter requesting a list of key words to match. All lines containing any of the key words are highlighted in the listing. Letters are automatically changed to upper-case since the databases use only upper-case. Matches are found even if the key word matches a part of a longer word.

search for key words to printer
: Pops up a prompter requesting a list of key words to match. The result is output directly. This is useful for large files that consume memory. All lines containing any of the key words are highlighted in the listing.

explain parameter
: Pops up a window with an explanation of the currently selected parameter extracted from TRAINER definitions files.

  TRAINER is a training tool for KILTING and EWIR developed for the U.S. Department of Defense by J. Lamicela of Research Associates of Syracuse, North Syracuse, NY.

  Explanations are only valid for lines beginning with Kilting style parameter tree numbers. Kilting style subfiles list these. As well, a special parameter which may be collected for Kilting style databases, 'PARAMETER TYPE', also lists lines beginning with tree numbers.

  Changes made by the user to the explanations are not retained.

HELP - Described in 3.1.2.

3.8 Pane 8 - Parameters/Subfiles Label

By clicking on this pane, parameter and subfile listings alternate in Pane 6.

3.8.1 Main Menu for Pane 8

about this pane

HELP

3.8.2 Descriptions of Pane 8 Menu Items

about this pane

If PARAMETERS is selected, shows SUBFILES and replaces the PARAMETERS pane with the SUBFILES pane.

If SUBFILES is selected, shows PARAMETERS and replaces the SUBFILES pane with the PARAMETERS pane.

HELP - Described in 3.1.2.

4.0 The Analysis Windows

Analysis of the emitter data is performed using the windows described in this section.

4.1 Histogram Browser Window

This window may be opened for browsing the histogram of a selected parameter. Two types of histograms are available, numeric and alphanumeric, depending on the type of data to be histogrammed. For example, the histogram would be numeric for RF limits, and would be alphanumeric for emitter function.

4.1.1 Numeric Histogram

There are 4 panes in this histogram window, shown in Figure 4.1. The histogram shows the numeric values of the parameter along the x-axis, divided into bins.

4.1.1.1 Pane H1 - Label Bar

This label bar behaves in the same manner as the label bar described in section 3.2.

4.1.1.2 Pane H2 - Histogram

This pane displays the histogram of the numeric values. The bin width is calculated by the system to be a round number (1 or a multiple of 10) such that there is less than 1000 bins. One or more bins may be selected for more detailed analysis.

A bin is selected by placing the cursor on the bin of interest and clicking the left mouse button. More than one bin can be selected by indicating a range of bins. The first bin is selected with a click of the left mouse button and the second bin extent is indicated by positioning the cursor over the bin and clicking the left mouse button while pressing the shift key. Alternately, the extent can be indicated by placing the cursor at one bin, along the x-axis, and, while holding down the left mouse button dragging the cursor to the second bin extent. Selected bins are indicated by a heavy red line along the x-axis.

Emitters contained in the selected bins are listed in the emitters list pane (H3).

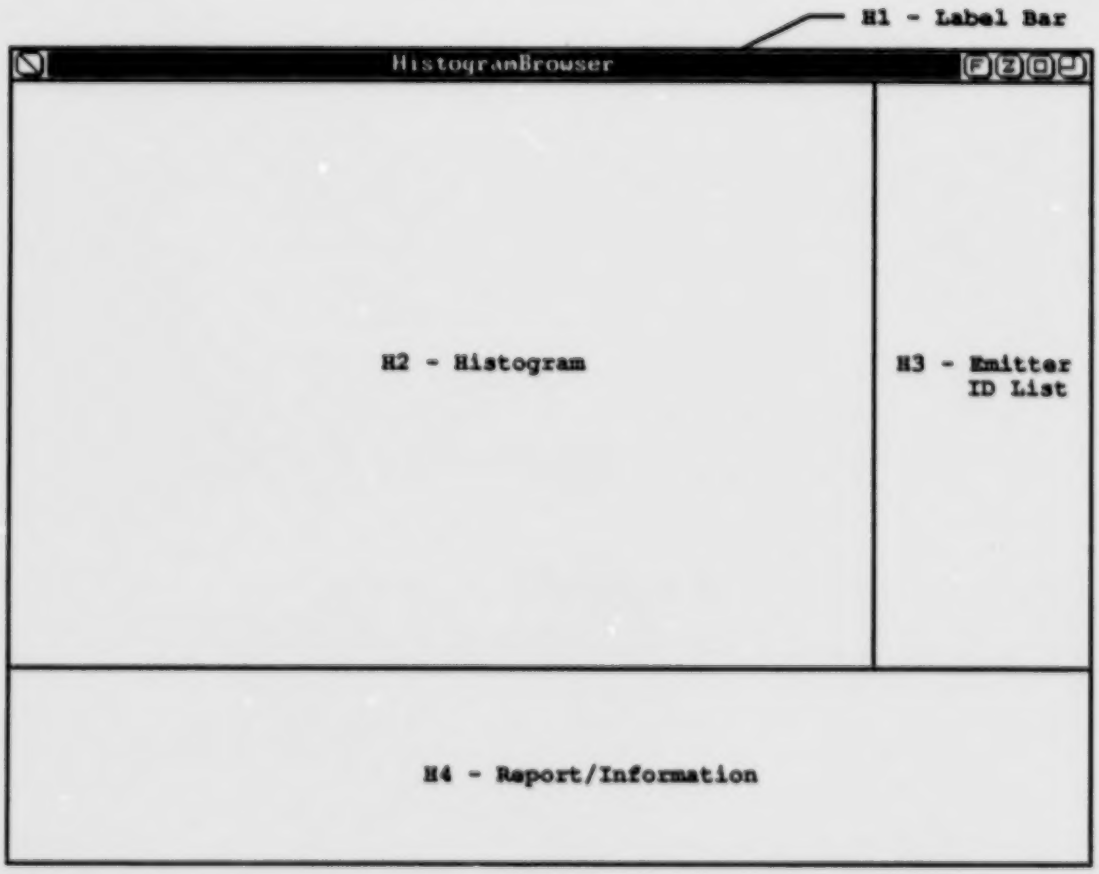

Figure 4.1 The Panes of the Histogram Browser Window

4.1.1.2.1 Main Menu for Pane H2

restore

change bin width

zoom selection

statistics

Statistics - supplementary menu

means histogram

standard deviations histogram

percent deviation histogram

percent spread histogram

percent width histogram

about this pane

HELP

HELP - supplementary menu

copyright

about histogram browser

how to get menu help

how to exit

print help report

4.1.1.2.2 Descriptions of Pane H2 Menu Items for Numeric Histogram

about this pane

This pane displays a histogram of values of a numeric attribute of a collection of emitters. The x-axis represents the value bins and the y-axis represents the hits, ie. number of emitters contributing to each bin.

To select a single bin, the user must move the cursor to the bin and select with the mouse left button. To select a range of bins, he must move the cursor to the initial bin, press the mouse left button and hold it while moving the mouse, then let go when the cursor is in the final bin. Selected bins are

indicated by a heavy red line along the x-axis. Emitters contributing to selected bins are listed in the EMITTER ID LIST PANE.

The initial bin width is calculated to be a multiple of one or ten such that there is less than 1000 bins.

restore
Restores initial plot.

change bin width
Prompts the user for a new bin width with the current bin width offered as the default. The histogram is redrawn with the new bin width.

zoom selection
Expands the selected part of the histogram to fill the entire plot pane.

statistics
Pops up a supplementary menu for statistics options.

means histogram
Opens a new histogram browser on the means of the histogram.

Means are calculated as follows: The medians of all ranges for each emitter are determined; the mean value of those medians is determined for each emitter; then these are histogrammed.

standard deviations histogram
Opens a new histogram browser on the standard deviations of the histogram.

Standard deviations are calculated as follows: For each emitter of the histogram, calculate the standard deviation of the medians of all the measurement values.

percent deviation histogram
Opens a new histogram browser on the percent deviations of the histogram.

Percent deviation is the ratio of the standard deviation over the mean, expressed as a percentage.

percent spread histogram
Opens a new histogram browser on the percent spread of the histogram.

Percent spread is the ratio of the maximum distance from the mean over the mean, expressed as a percentage.

percent width histogram

Opens a new histogram browser on the percent width of the histogram.

Percent width is the ratio of the maximum width from the mean over the mean, expressed as a percentage.

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about histogram browser

The Histogram Browser is an analysis tool which enables the user to view the histogram of emitters contributing to bins of numeric values.

how to get menu help

Most menu items in the Histogram Browser have help text available. By selecting the menu item with the right mouse button, a special window pops up describing the selected menu item. To exit, the user must move the cursor outside the window and press any mouse button.

If desired, the user may edit the help text. To preserve edits, he may select the looping arrow icon at the upper right or pop up the menu in the help pane and select ACCEPT.

how to exit

Clicking on the square icon in the upper left of the browser window exits DEBU.

print help report

Outputs to the printer (or file) a formatted report comprising all help descriptions of all menu items.

4.1.1.3 Pane H3 - Emitter ID List

If one or more bins have been selected in the histogram pane (H2) then the IDs of the emitters contained in those bins are listed in this pane. If one or more emitters in the list is highlighted, information on those emitters is displayed in the bottom pane (H4).

4.1.1.3.1 Main Menu for Pane H3 if One or More Emitter IDs are Listed

browse selection

remove selection

about this pane

HELP

4.1.1.3.2 Main Menu for Pane H3 if No Emitter IDs are Listed

list all

about this pane

HELP

4.1.1.3.3 Descriptions of Pane H3 Menu Items for Numeric Histogram

about this pane
Emitter IDs are the names of the emitters contributing to the bins in the plot pane.

From this pane, selected emitters may be browsed or removed.

browse selection
Opens a browser on the selected emitter ID(s).

remove selection
Removes selected emitters from current list of emitter IDs. Shows the resulting plot with the selected emitters removed.

list all
Lists all of the emitters. This behaves the same as if all bins were selected.

HELP - Described in 4.1.1.2.1 and 4.1.1.2.2.

4.1.1.4 Pane H4 - Report/Information

This pane contains general information about the histogram if no emitter ID in pane H3 is selected. Otherwise it contains information on the selected emitter.

4.1.1.4.1 Main Menu for Pane H4

zoom on text

about this pane

HELP

4.1.1.4.2 Descriptions of Pane H4 Menu Items for Numeric Histogram

about this pane
This pane serves as the place where all reports are displayed. Information in this pane depends on last item selected and on

menu operations.

zoom on text
Zooms text to fill entire screen. This is useful if the text pane has a lot of information.

To exit zoom, the user may either press function key F8 or, with the mouse, click on the label bar at the top of the screen.

HELP - Described in 4.1.1.2.1 and 4.1.1.2.2.

4.1.2 Alphanumeric Histogram

The four panes in the alphanumeric histogram are in the same positions as for the numeric histogram (see Figure 4.1), only the content is different. In the histogram pane (H2) each alphanumeric name is listed down the left side of the pane and the number of occurrences of each is indicated on each associated line.

If an emitter ID is selected in pane H3 then all the bins containing that emitter are shown on the histogram (pane H2).

4.1.2.1 Pane H1 - Label Bar

This label bar behaves in the same manner as the label bar described in section 3.2.

4.1.2.2 Pane H2 - Histogram

Each bin represents an alphanumeric item. The number of occurrences for each item is indicated. An item may be selected by clicking on it; emitter IDs related to that item are listed in pane H3.

4.1.2.2.1 Main Menu for Pane H2

restore

about this pane

HELP

HELP - supplementary menu

copyright

about non-numeric histogram browser

how to get menu help

how to exit

print help report

4.1.2.2.2 Descriptions of Pane H2 Menu Items for Alphanumeric Histogram

about this pane

This pane shows a textual bar-graph of a non-numeric attribute of a collection of emitters.

restore

Restores initial plot.

copyright

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about non-numeric histogram browser

This browser is similar to the regular numeric histogram browser, except that attribute values are listed explicitly and the number of emitters contributing to a given attribute value is shown as a bar-graph.

how to get menu help

Most menu items in the Histogram Browser have help text available. By selecting the menu item with the right mouse button, a special window pops up describing the selected menu item. To exit, the user must move the cursor outside the window and press any mouse button.

If desired, the user may edit the help text. To preserve edits, he may select the looping arrow icon at the upper right or pop up the menu in the help pane and select ACCEPT.

how to exit

Clicking on the square icon in the upper left of the browser window exits DEBU.

print help report

Outputs to the printer (or file) a formatted report comprising all help descriptions of all menu items.

4.1.2.3 Pane H3 - Emitter ID List

If one or more bins have been selected in the histogram pane (H2) then the IDs of the emitters contained in those bins are listed in this pane. If an emitter in the list is highlighted, information on that emitter is displayed in the bottom pane (H4).

4.1.2.3.1 Main Menu for Pane H3 if One or More Emitter IDs are Listed

browse selection

remove selection

about this pane

HELP

4.1.2.3.2 Main Menu for Pane H3 if No Emitter IDs are Listed

list all

about this pane

HELP

4.1.2.3.3 Descriptions of Pane H3 Menu Items for Alphanumeric Histogram

about this pane
Emitter IDs are the names of the emitters contributing to the bins in the plot pane.

From this pane, selected emitters may be browsed or removed.

browse selection
Opens a browser on the selected emitter ID(s).

remove selection
Removes selected emitter(s) from current list of emitter IDs. Show the resulting plot with the selected emitters removed.

list all
Lists all of the emitters. This behaves the same as if all bins were selected.

HELP - Described in 4.1.2.2.1 and 4.1.2.2.2.

4.1.2.4 Pane H4 - Report/Information

This pane contains general information about the histogram if no emitter ID in pane H3 is selected. Otherwise it contains information on the selected emitters.

4.1.2.4.1 Main Menu for Pane H4

zoom on text

about this pane

HELP

4.1.2.4.2 Descriptions of Pane H4 Menu Items for Alphanumeric Histogram

about this pane

This pane serves as the place where all reports are displayed. Information in this pane depends on last item selected and on menu operations.

zoom on text

Zooms text to fill entire screen. This is useful if the text pane has a lot of information.

To exit zoom, the user may either press function key F8 or, with the mouse, click on the label bar at the top of the screen.

HELP - Described in 4.1.2.2.1 and 4.1.2.2.2.

4.2 The Two-Parameter Plot Browser Window

A window may be opened for browsing a two-dimensional plot of two numeric parameters. There are four panes in the two-parameter plot window, as shown in Figure 4.2.

4.2.1 Pane T1 - Label Bar

This label bar behaves in the same manner as the label bar described in Section 3.2.

4.2.2 Pane T2 - Two-Parameter Plot

One of the two-parameter selections is displayed on the x-axis and the other is displayed on the y-axis. The range of units on the axes is calculated from the selected emitters.

A portion of the plot may be selected by drawing a rectangle around a section of the plot. To accomplish this, the user must position the cursor on the upper left extent of the rectangle and, while holding the button down, move the cursor to the lower right extent of the rectangle; then lift the mouse button. The information within the rectangle is then displayed in red. All emitters within the rectangle are listed in the emitter ID list pane (T3).

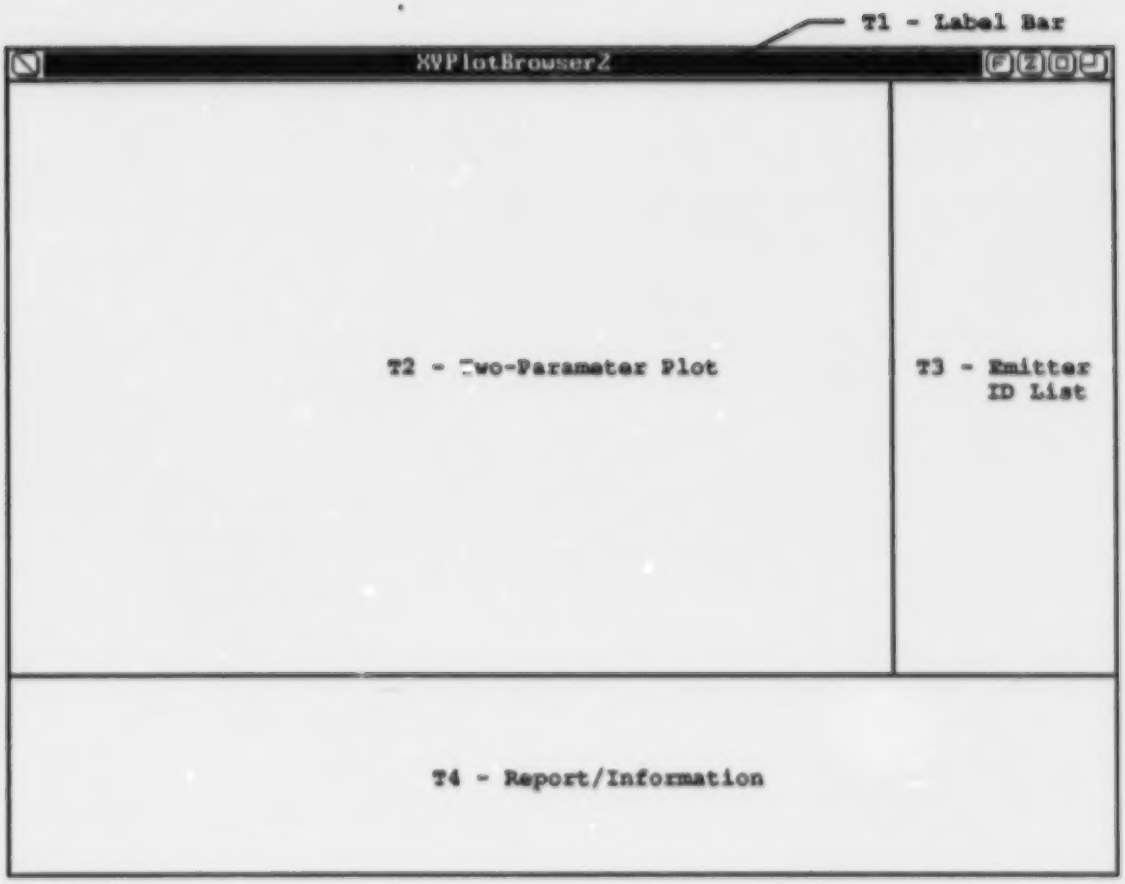

Figure 4.2 The Panes of the Two-Parameter Plot Browser Window

4.2.2.1 Main Menu for Pane T2

restore

zoom selection

about this pane

HELP

> **HELP - supplementary menu**
>
> copyright
>
> about two-parameter browser
>
> how to get menu help
>
> how to exit
>
> print help report

4.2.2.2 Descriptions of Pane T2 Menu Items

about this pane

> This pane displays an x-y plot of values of two numeric attributes of a collection of emitters. The x-axis corresponds to the first parameter and the y-axis corresponds to the second parameter. Bins represent the contribution of an emitter.
>
> The user may select a two-dimensional bin by moving the cursor to one corner of the bin of interest, pressing the mouse left button and letting go when the cursor is at the second corner. The colour of selected bins changes to red. Emitter IDs contributing to selected bins are listed in the EMITTER ID LIST PANE.

restore

> Restores initial plot.

zoom selection

> Expands the selected part of the histogram to fill the entire plot pane.

copyright

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about two-parameter browser

The Two-Parameter Browser is an analysis tool which enables the user to view an x-y plot of emitters contributing to bins of two numeric values.

how to get menu help

Most menu items in the Histogram Browser have help text available. By selecting the menu item with the right mouse button, a special window pops up describing the selected menu item. To exit, the user must move the cursor outside the window and press any mouse button.

If desired, the user may edit the help text. To preserve edits, he may select the looping arrow icon at the upper right or pop up the menu in the help pane and select ACCEPT.

how to exit

Clicking on the square icon in the upper left of the browser window exits DEBU.

print help report

Outputs to the printer (or file) a formatted report comprising all help descriptions of all menu items.

4.2.3 Pane T3 - Emitter ID List

If one or more bins have been selected in the two-parameter plot pane (T2) then the emitters IDs indicated by the selection are listed in this pane. If one or more emitter IDs are selected from this pane, their location is indicated in red in the two-parameter plot (T2).

4.2.3.1 Main Menu for Pane T3 If One or More Emitter IDs are Listed

browse selection

remove selection

about this pane

HELP

4.2.3.2 Main Menu for Pane T3 if No Emitter IDs are Listed

list all

about this pane

HELP

4.2.3.3 Descriptions of Pane T3 Menu Items

about this pane
Emitter IDs are the names of the emitters contributing to the bins in the plot pane.

From this pane, selected emitters may be browsed or removed.

browse selection
Opens a browser on the selected emitter ID(s).

remove selection
Removes selected emitters from current list of emitter IDs. Shows the resulting two-parameter plot with the selected emitters removed.

list all
Lists all of the emitters. This behaves the same as if all bins were selected.

HELP - Described in 4.2.2.1 and 4.2.2.2.

4.2.4 Pane T4 - Report/Information

This pane contains general information associated with the plot pane (T2). If there is a list of emitters but none are selected then the ranges of all the emitters in the list are described. If one or more emitters are highlighted then the ranges of those highlighted emitters are described.

4.2.4.1 Main Menu for Pane T4

zoom on text

about this pane

HELP

4.2.4.2 Descriptions of Pane T4 Menu Items

about this pane
This pane serves as the place where all reports are displayed. Information in this pane depends on the last item selected and on menu operations.

zoom on text
Zooms text to fill entire screen. This is useful if the text pane has a lot of information.

To exit zoom, the user may either press function key F8 or, with the mouse, click on the label bar at the top of the

screen.

HELP - Described in 4.2.2.1 and 4.2.2.2.

4.3 The Ambiguity Analysis Window

The ambiguity analysis window may be opened for browsing the organization and contents of the ambiguity sets. The ambiguity sets are obtained as follows: If there is an emitter whose selected parameters do not overlap the selected parameters of any other selected emitter (at some point in space), then that emitter would be listed in the ambiguity set of size one. If the selected parameters of a selected emitter only overlap those of one other emitter (at some point in space), then that emitter pair would be listed in the ambiguity set of size two. The ambiguity set sizing continues until all emitters have been checked against all other emitters.

Figure 4.3 shows the five panes of the ambiguity analysis window.

4.3.1 Pane A1 - Label Bar

This label bar behaves in the same manner as the label bar described in Section 3.2.

4.3.2 Pane A2 - Histogram

This pane displays the histogram of the ambiguity sets. The size of the ambiguity sets is indicated along the x-axis and the number of sets in each of the bins is indicated along the y-axis.

A bin is selected by placing the cursor on the bin of interest and clicking the left mouse button. More than one bin can be selected by indicating a range of bins. The first bin is selected with a click of the left mouse button and the second bin extent is indicated by positioning the cursor over the bin and clicking the left mouse button while pressing the shift key. Alternately, the extent can be indicated by placing the cursor at one bin, along the x-axis, and, while holding down the left mouse button dragging the cursor to the second bin extent. Selected bins are indicated by a heavy red line along the x-axis.

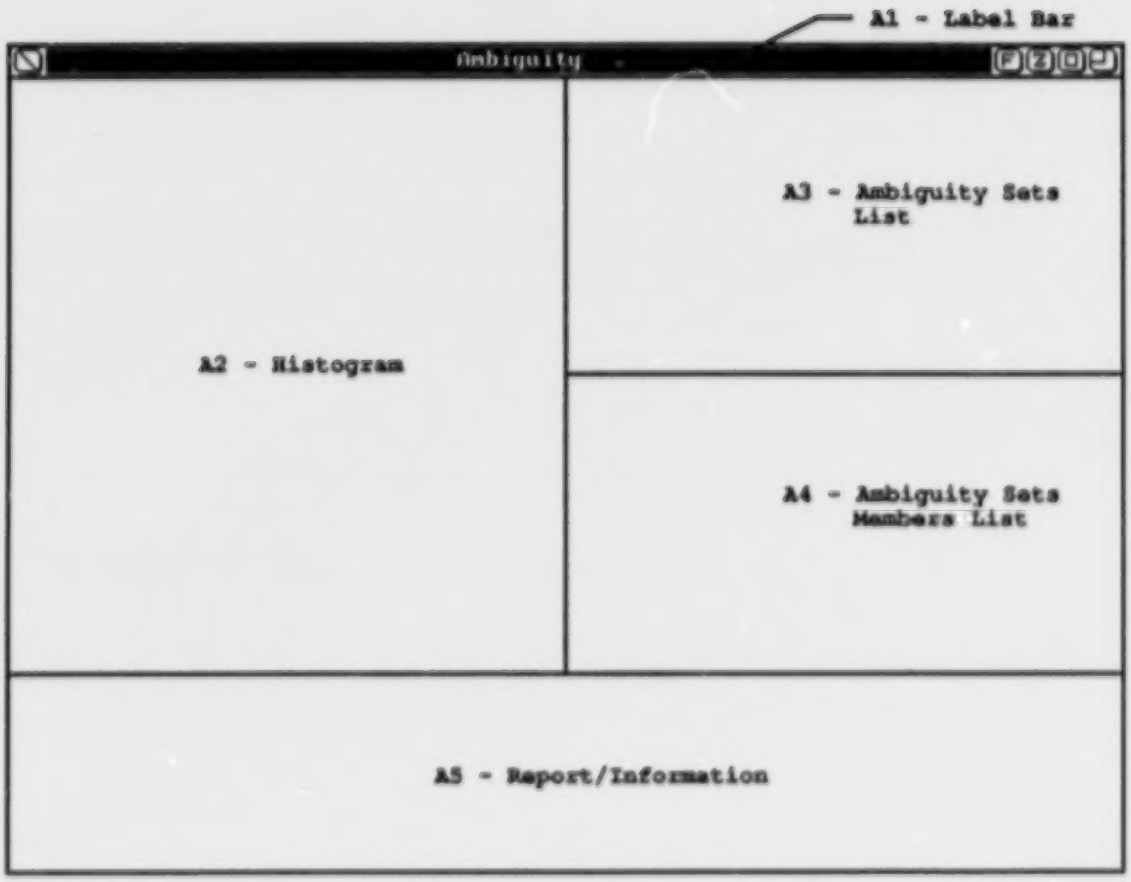

Figure 4.3 The Panes of the Ambiguity Analysis Window

4.3.2.1 Main Menu for Pane A2

restore

zoom selection

about this pane

HELP

HELP - supplementary menu

copyright

about ambiguity browser

how to get menu help

how to exit

print help report

4.3.2.2 Descriptions of Pane A2 Menu Items

about this pane
This pane displays a histogram of the sizes of ambiguity sets for a collection of emitters. The x-axis represents the sizes of the ambiguity sets and the y-axis represents the hits, ie. number of ambiguity sets for each size.

To select a single bin, the user must move the cursor to the bin and select it with the mouse left button. To select a range of bins, he must move the cursor to the initial bin, press the mouse left button and hold it while moving the mouse, then let go when the cursor is in the final bin. Selected bins are indicated by a heavy red line along the x-axis. Ambiguity sets contributing to selected bins are listed in the EMITTER ID LIST PANE.

restore
Restores initial plot.

zoom selection
Expands the selected part of the histogram to fill the entire plot pane.

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about ambiguity browser

The Ambiguity Browser is an analysis tool which enables the user to view the ambiguity of emitters contributing to bins of numeric and non-numeric values.

An ambiguity set is a set of emitters which, due to some overlap in parameter space, cannot be distinguished from one another. The Ambiguity Browser organizes ambiguity sets according to the number of members in each set. A set having only one member is not ambiguous.

how to get menu help

Most menu items in the Histogram Browser have help text available. By selecting the menu item with the right mouse button, a special window pops up describing the selected menu item. To exit, the user must move the cursor outside the window and press any mouse button.

If desired, the user may edit the help text. To preserve edits, he may select the looping arrow icon at the upper right or pop up the menu in the help pane and select ACCEPT.

how to exit

Clicking on the square icon in the upper left of the browser window exits DEBU.

print help report

Outputs to the printer (or file) a formatted report comprising all help descriptions of all menu items.

4.3.3 Pane A3 - Ambiguity Sets List

If one or more bins have been selected, the sets contained in each selected bin are listed in this pane. Each set is referred to as an Ambiguity set. Clicking on one or more ambiguity sets highlights the corresponding bins in the HISTOGRAM PANE (A2), and lists the set contents or members in the AMBIGUITY SETS MEMBERS PANE (A4).

4.3.3.1 Main Menu for Pane A3 if One or More Ambiguity Sets are Listed

browse selection

remove selection

about this pane

HELP

4.3.3.2 Main Menu for Pane A3 if No Ambiguity Sets are Listed

list all

about this pane

HELP

4.3.3.3 Descriptions of Pane A3 Menu Items

about this pane
This pane lists all of the ambiguity sets of the selected bins in the HISTOGRAM PANE. Each ambiguity set contains the IDs of its member emitters.

From this pane, selected ambiguity sets may be browsed or removed from consideration.

browse selection
Opens a browser on the selected emitter ID(s).

remove selection
Removes selected emitters from current list of emitter IDs. Shows the resulting histogram with the selected emitters removed.

list all
Lists all of the emitters. This behaves the same as if all bins were selected.

HELP - Described in 4.3.2.1 and 4.3.2.2.

4.3.4 Pane A4 - Ambiguity Sets Members List

The set contents, or members, are listed in this pane for each of the highlighted emitter ID sets in pane A3.

4.3.4.1 Main Menu for Pane A4 if One or More Members are Listed

browse selection

remove selection

about this pane

HELP

4.3.4.2 Main Menu for Pane A4 if No Members are Listed

list all

about this pane

HELP

4.3.4.3 Descriptions of Pane A4 Menu Items

about this pane
This pane lists all of the members of the ambiguity sets of the selected bins in the HISTOGRAM PANE.

From this pane, selected emitters may be browsed or removed from consideration.

browse selection
Opens a browser on the selected emitter(s).

remove selection
Removes selected emitters from current list of emitter IDs. Shows the resulting plot with the selected emitters removed.

list all
Lists all of the emitters. This behaves the same as if all bins were selected.

HELP - Described in 4.3.2.1 and 4.3.2.2.

4.3.5 Pane A5 - Report/Information

This pane contains general information associated with the browser. If no bins have been selected then a general description of the data in the browser is shown. If a bin has been selected this pane gives a description of the bin. If a set has been selected this pane lists the set contents.

4.3.5.1 Main Menu for Pane A5

zoom on text

about this pane

HELP

4.3.5.2 Descriptions of Pane A5 Menu Items

about this pane
This pane serves as the place where all reports are displayed. Information in this pane depends on last item selected and on menu operations.

zoom on text
Zooms text to fill entire screen. This is useful if the text pane has a lot of information.

To exit zoom, either press function key F8 or, with the mouse,

click on the label bar at the top of the screen.

HELP - Described in 4.3.2.1

5.0 REPORTS

DEBU provides a variety of options for producing reports, either to files for inclusion in a document or for immediate output to a printer. There are two kinds of reports. The first is textual, where information is conveyed in words; the second is graphical, where information is conveyed in the form of a picture, typically what is seen on the screen.

5.1 Printer Set-up

Figure 5.1 shows a Printer Set-up Dialogue Box. From here, the user may choose the name of the file to be printed, a header (title at the top of each page), a footer (title at the bottom of each page), a classification (eg. NONE, UNCLASSIFIED, SECRET or CONFIDENTIAL), an orientation (eg. portrait or landscape) and a page numbering. The user may choose to output to a file or to a printer. Smalltalk does not print directly to a printer. Rather, it first writes to a file, then issues a DOS command to print. By default, DEBU deletes the file after printing. To keep the file, the user simply turns off the check-mark next to the line DELETE FILE AFTER PRINT.

5.2 Textual Reports

Textual reports are normally previewed in the Report Pane before printing. Any report or information in the Report Pane may be printed by popping up the menu in the Report Pane and selecting the line PRINT CONTENTS. Immediately, a Printer Set-up Dialogue appears to set up the output format. If a keyword search is done in the report pane, then the highlighted lines appear in bold format on the hardcopy.

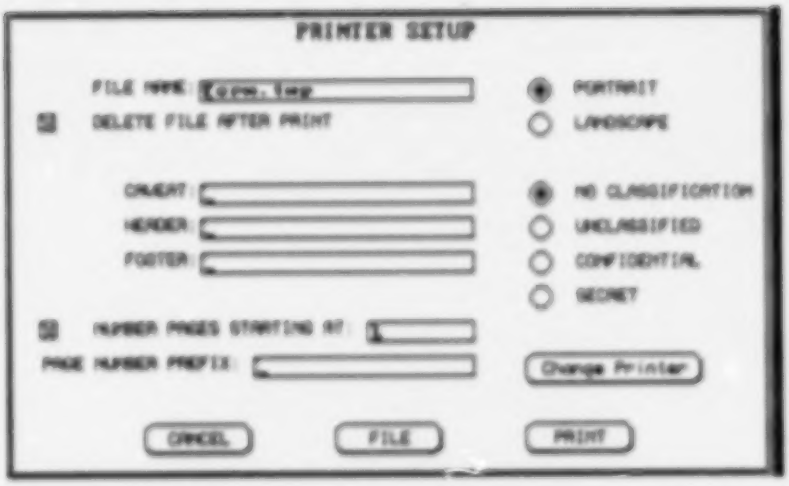

Figure 5.1 The Printer Set-up Dialogue Box

Reports available from DEBU include:

DEBU HELP REPORT

The DEBU Help Report is a formatted listing of the Help text to date. This might be used if changes have been made to the original Help text. To print the DEBU Help Report, the user must pop up the Help menu and select the line PRINT HELP REPORT.

FORMATTED EMITTER SOURCE REPORT

The formatted emitter source report is a formatted listing of the subfiles followed by all of the comments for each selected emitter. If more than one emitter is selected, emitter source is printed one after another, according to the order of selection.

By default, DEBU uses landscape (wide pages) with SECRET classification. Formatting includes titles, centering and bolding. To print a formatted emitter source report, the user must pop up the menu in the Emitter List Pane and select the line OPTIONS FOR PRINTING. A supplementary menu appears. The user must then select the line FORMATTED EMITTER SOURCE REPORT. All of the selected emitters are then printed. If no emitter is selected, DEBU assumes that the entire selected database is to be printed.

RAW SOURCE REPORT

This report lists the subfiles and comments of the selected emitters without formatting. This report might be useful to verify that no useful information is missed by DEBU. To print a raw source report, the user must pop up the OPTIONS FOR PRINTING supplementary menu in the Emitter List Pane and select the line PRINT RAW SOURCE.

USER NOTES

This report lists the user notes for the selected emitters. If no notes have been made for a given emitter, DEBU skips over it. To print user notes, he must pop up the OPTIONS FOR PRINTING supplementary menu in the Emitters List Pane and select the line PRINT USER NOTES. This prints user notes for emitters currently selected, or for the selected database if no emitter is selected.

SUBFILES REPORT

This report lists the selected subfiles for the selected emitters. Comments relating to a given subfile follow that subfile directly. Normally, the user selects one emitter from the Emitters List Pane and then selects a subfile, or more than one subfile, to browse from the Subfiles List Pane. If the user selects more than one emitter, then DEBU switches from listing Subfiles to listing Parameters. This report may

be printed by the usual method from the Report Pane.

PARAMETER REPORT BY PARAMETERS
This report lists parameter values. Beside each parameter value is a list of emitters from the current database which can produce the value. This report is the default report in the Report Pane when no emitter, or more than one emitter, is selected and a parameter is selected. As well, this report can be obtained by selecting the line PARAMETER REPORT BY PARAMETERS in the Parameters List Pane menu. This report may be printed by the usual method from the Report Pane.

PARAMETER REPORT BY EMITTERS
This report lists emitters from the current database. Beside each emitter is a list of parameter values associated with the emitter. This report is obtained by selecting the line PARAMETER REPORT BY EMITTERS in the Parameters List Pane menu. This report may be printed by the usual method from the Report Pane.

MODES REPORT
This report lists the modes of the selected emitters for the selected parameters. Modes are valid combinations of parameter values, i.e. sets of parameter values which may appear together. A modes report is arranged as a table, with the first column identifying the emitter and mode, and with subsequent columns listing values of the selected parameters. Each column of a modes report table is headed by an identifying title. This report is obtained by selecting MODES REPORT in the Parameters List Pane when one or more parameters are selected. This report may be printed by the usual method from the Report Pane.

5.3 Pictorial Reports

In histogram or ambiguity analysis, the primary output of interest is the plot. The only reasonable output format is therefore pictorial rather than textual. To output portions of the screen to a file or printer, the user must select the F2 function key. The user is asked to confirm that he wishes to print the screen. Upon confirmation, he is prompted to frame the portion (or all, if desired) of the screen to be output. The standard Printer Set-up Dialogue box then appears.

6.0 CONCLUSIONS

DEBU meets a need in the ESM and Elint communities for reviewing and analyzing Elint and EW databases quickly, easily and effectively. DEBU enables analysis of a number of Elint and EW databases of differing formats. DEBU's operating environment is inexpensive and widely available since it is based on a PC. The functionality of DEBU and how to operate DEBU 3.0 are described in detail in this report.

DEBU can be used effectively for many ESM and Elint related purposes. A new user can easily learn details of the databases by browsing the information. Quick database searches can be done. A user can create database subsets which could be used for mission libraries or trials, or to study sets of similar emitters. DEBU can be used to do parameter analysis with the graphical aid of histograms and two-dimensional plots. Furthermore, DEBU can be used to do ambiguity, or overlap, analysis.

Although DEBU is not intended for creating Orders of Battle or for editing Elint ore EW databases these applications could easily be expanded in DEBU. DEBU would support a single user reviewing, creating or editing a database at a time.

Due to the flexibility and considerable capabilities of DEBU, early releases of the package have been popular at DREO and in DND. It is the authors' hope that it will continue to successfully assist many more people in the ESM and Elint communities.

7.0 REFERENCES

[1] Ford, B. and Jones, D., "Introducing the DREO Elint Browser Utility (DEBU)", DREO Technical Note 91-7, 1991.

[2] "Smalltalk/V 286 Tutorial and Programming Handbook", Digitalk Inc., 1988.

APPENDIX A: GLOSSARY

image - The result of saving the appearance and state of a Smalltalk session. The term "image" was coined because the process is analogous to taking a snapshot.

database source file - Comprises the collection of emitter records. It is only read by DEBU and not changed in any way.

root database - For each database source file, DEBU maintains a list of pointers to the starting location of the records for each emitter. Each of these lists of pointers is referred to as a root database with respect to DEBU.

database subset - A subset of a root database. Typically there are fewer emitters listed in a subset since it is obtained as the result of applying filtering operations on a root database or on another database subset.

derived database - A database subset which has been named and saved for future use.

parameter - A measurement or characteristic which has a name, such as RF LIMITS, and a value (range), such as 9350 MHz (to 9380 MHz).

subfile - A group of related parameters, typical to Kilting-style database organization.

batch parameters - A list of names of parameters kept by DEBU which may be used to "batch" collect a selection of parameters for a new database. Suppose that the user installed an update of a current database for which he had collected parameters. If he wants to collect the same parameters for the new database, then he adds the parameter names for all of the parameter of interest.

load file - Special files used by Smalltalk to load and unload complex data structures.

ambiguity set - A set of emitters which, due to some overlap in parameter space, cannot be distinguished from each other.

APPENDIX B: PRINTER INFORMATION

Printer Support

Internally, DEBU has a simple protocol for formatting text, based in large part on the Smalltalk TextEditor and Stream classes. This simple protocol means that text sent to the printer may be viewed on the terminal, even though the terminal does not support all of the functionality of the printer (eg. bolding and centering). This also means that it is possible to create printer support for a variety of printers without rewriting all of the report generators. It is only necessary to supply the imbedded control sequences for the printer.

To date, the only printers fully tested to work with the DEBU image are the Apple LaserWriter II printer and plain text printers. The former is a PostScript printer; the latter is any printer other than PostScript which can print plain text files without imbedded control sequences. The plain text printer cannot print graphical reports. Two others printers, the Hewlett-Packard LaserJet Series II printer and the Xerox 4045 printer, have support implemented but not tested.

Initialising the GO File

If the available printer has support, edit the GO file to include the line:

```
PrintStream yourPrinterSupport; dosPrintCommand: 'print'.
```

where yourPrinterSupport is the name of the method corresponding to the available printer and 'print' is the command that the operating system expects in order to print. For example, on a Novell network, this would be 'nprint'.

APPENDIX C: LOADING DATABASES

DEBU makes adding new databases as painless as possible. To add a new database, the user simply edits the GO file with the new database name and starts the DEBU image as usual. The choice of database name is important. There should be no spaces in the name. If the file is EPL or NEDB, then the database name should start with 'EPL' or 'NEDB' respectively. The default format of Elint or EW database files is that of Kilting. If the database name starts with 'EPL' or 'NEDB', then DEBU assumes an EPL format. It is recommended that each database name have a year and update code uniquely identifying it. For example, 'EPL91b'.

A sample GO file is as follows:

```
DisplayScreen VGA640x480!
RawFileStream initialize.
PrintStream printer: #AppleLaserWriter:
   dosPrintCommand: 'nprint'.
Sources at: 1 put: (
   File pathName: 'c:\v\v286\sources.sml').
Smalltalk openChangeLogIn: Disk.
Smalltalk loadPrimitivesFrom: 'far21.bin'.
ElintObject
   PicturesPath: 'e:\pictures';
   DefinitionsPath: 'e:\trainer\defns';
   addSources: #(EPL91B KILTING88)
   paths: #('e:\epl91b\epl91b.src'
        'e:\kilt88\kilt88.src')!
```

Every time the DEBU image comes up, it updates all references to databases. This means, for example, that a DEBU image can be moved from one system to another and, as long as the GO file has been corrected for the new system, DEBU will find all of the referenced files. If DEBU has not previously loaded a database referred to in the GO file, then DEBU attempts to load the database at start-up. If DEBU cannot find a referenced database file, DEBU attempts to load the database from tape.

To add a new database the user must:

1. Edit the GO file to include the name of the database and the path to the database file. If the path involves a new directory, DEBU will create it.

2. Exit the editor, saving the GO file as text.

3. Start DEBU as usual.

Next, DEBU does the following:

1. DEBU updates itself with respect to all databases mentioned in the GO file. If a database is mentioned which DEBU does not know about, DEBU asks the user whether the new database is to be loaded. If the user answers "no", then DEBU simply doesn't load it and continues as usual. If the user answers "yes", then DEBU attempts to load the new database by reading in the corresponding file mentioned in the GO file. Note that, at this stage, the DEBU screen normally contains only the prompts concerning the database load.

2. If the file exists, DEBU reads it. The file is expected to be lines of plain text with trailing blanks (optionally) removed. While loading, DEBU shows that it is busy with an hourglass and periodically updates the Transcript with the elnot and name of the last emitter read.

3. If the file does not exist or is of size zero, then DEBU assumes that the file is to be loaded from tape. At each step, DEBU asks for confirmation. If the user chooses no, then DEBU simply stops what it is doing and continues to boot the DEBU image without the new database. DEBU first asks the user to confirm that the database is to be loaded from tape. If the user chooses yes, then DEBU prompts for the user to indicate when the tape is loaded in the tape drive and the drive is ready and on-line. The loading process itself takes time, approximately 1 hour per 10 MB. DEBU first reads the header, if any, to determine the tape format. If there is no header then DEBU will prompt the user for the information. Then DEBU reads each block from tape, stripping trailing blanks off lines and writing the new lines of text to the file on disk. At the same time, DEBU notes the position of each emitter in the database. On completion, DEBU rewinds the tape and prompts the user to save the image.

4. In the event that the file is continued on a second tape, DEBU rewinds the first tape and again prompts for the user to indicate when the tape is loaded in the tape drive and the drive is ready and on-line. DEBU continues where it left off, until completion.

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(U) An Elint database browsing tool called DEBU is presented. DEBU allows Elint and EW databases, such as EPL, Kilting, EWIR and AFEWC, to be easily reviewed and analyzed from a PC workstation. DEBU's basic function is to allow users to examine the contents of user-selected subfiles of user-selected emitters of user-selected databases. DEBU augments this functionality with support for selecting (filtering) and combining subsets of emitters by user-selected attributes such as ELNOT, name, parameter type or parameter value. DEBU provides facilities for examining histograms and x-y plots of selected parameters, for doing ambiguity analysis and mode level analysis, as well as for the generation and printing of a variety of reports. With its multiple windows, pop-up menus and help support, DEBU is easy to use.

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